CLAIMS

1. A method for estimating curvilinear distance within a region where a craft with limited maneuverability is traveling and which contains potential obstacles to be circumvented, which region is referred to as travel region, in which a map of distances is established covering the travel region and having as origin of the distance measurements the instantaneous position (S) of the craft, characterized in that it consists, when the distance map is established, in completing the potential obstacles to be circumvented (10, 11) by an additional obstacle to be circumvented (20), placed in the neighborhood of the craft and associated with the craft, cataloging areas of the near neighborhood of the craft considered to be inaccessible to the craft owing to its limited maneuverability.

2. The method as claimed in claim 1, characterized in that the additional obstacle (20) is of concave shape and disposed in the neighborhood of the instantaneous position (S) of the craft in such a manner that its concavity is turned into the direction of the motion of the craft and encompasses the instantaneous position (S) of the craft.

3. The method as claimed in claim 1, characterized in that the additional obstacle (20) is U-shaped, the opening of the U being turned into the direction of the motion of the craft and encompassing the instantaneous position (S) of the craft.

4. The method as claimed in claim 1, characterized in that the additional obstacle has a half-moon shape, the opening of the half-moon being turned into the direction of the motion of the craft and encompassing the instantaneous position (S) of the craft.

5. The method as claimed in claim 1, characterized in that the additional obstacle (figures 7, 8, 9) has a dual-lobed butterfly-wing shape, placed on either side of the instantaneous position (S) of the craft and having a common tangent oriented in the direction of motion of the craft.

6. The method as claimed in claim 1, characterized in that, when the craft is an aircraft, the contour of the additional obstacle comprises parts corresponding to the ground projections of two circles (30, 31) associated with the aircraft, having a radius equal to the radius of curvature of the tightest turn allowed for the aircraft at the time being considered.

7. The method as claimed in claim 1, characterized in that, when the craft is an aircraft subject to a cross-wind, the contour of the additional obstacle comprises parts of a cycloid (figure 7) corresponding to the ground projections of two circles (30, 31) associated with the aircraft, having a radius equal to the radius of curvature of the tightest turn allowed for the aircraft at the time being considered.

8. The method as claimed in claim 1, characterized in that, when the craft is an aircraft subject to a cross-wind, the contour of the additional obstacle consists of two lobes of a cycloid (40, 40') limited to their parts going from their starting point, which is the instantaneous position (S) of the aircraft, to their second intersection (P, P') with the straight lines (41, 41') going from the instantaneous position (S) of the aircraft to virtual positions (P, P') on the cycloid lobes (40, 40') corresponding, for the aircraft, to an arbitrary track modification angle.

9. The method as claimed in claim 1, characterized in that, when the craft is an aircraft subject to a cross-wind, the contour of the additional obstacle consists of two lobes of a cycloid (40, 40') limited to their parts going from their starting point, which is the instantaneous position (S) of the aircraft, to their second intersection (P, P') with the straight lines (41, 41') going from the instantaneous position (S) of the aircraft to virtual positions (P, P') on the cycloid lobes corresponding, for the aircraft, to a track modification angle of 180 degrees.

10. The method as claimed in claim 1, characterized in that, when the craft is an aircraft subject to a cross-wind and the distance map is established within a geographical reference frame using longitudes and

latitudes, the contour of the additional obstacle (figure 7) has two parts (40, 40') in the form of cycloid lobes obeying the system of parametric equations:

$$\begin{pmatrix} x \\ y \end{pmatrix}_g = \begin{pmatrix} WS_{Xg}.t - \delta.R.\cos(wt + \gamma_g) + C_{Xg} \\ WS_{Yg}.t + R.\sin(wt + \gamma_g) + C_{Yg} \end{pmatrix}$$

x and y being the abscissae and ordinates of a point in the geographical reference frame of the distance map,

$\begin{pmatrix} WS_X \\ WS_Y \end{pmatrix}$ being the wind vector expressed in the geographical reference frame of the distance map,

with

$$R = \frac{TAS^2}{g.\tan\varphi_{roll}}$$

$$w = \frac{TAS}{R} = \frac{g.\tan\varphi_{roll}}{TAS}$$

TAS being the amplitude of the airspeed of the aircraft,

φ_{roll} being the roll angle of the aircraft during the maneuver,

γ being a factor that depends on the initial conditions,

δ being a coefficient equal to +1 for a right turn and -1 for a left turn, and with

$$C_{Xg} = Long + \delta.R.\cos(\gamma_g)$$

$$C_{Yg} = Lat - R.\sin(\gamma_g)$$

$$\gamma_g = \delta.Heading + k.\Pi$$

Long being the longitude of the instantaneous position of the aircraft,

Lat being the latitude of the instantaneous position of the aircraft, and

Heading being the flight direction of the aircraft.

11. The method as claimed in claim 1, characterized in that the additional obstacle taking into account the maneuverability limits of the craft is missing the surface area of a free angular sector starting from the craft and having its opening turned into the direction of motion of the craft.

12. The method as claimed in claim 11, characterized in that, when the distance map takes the form of a grid of cells corresponding to the elements of a database of elevation of the terrain covering the area of travel of the craft, the additional obstacle taking into account the maneuverability limits of the craft is missing the cells that are totally or partially covered by the free angular sector.

13. The method as claimed in claim 11, characterized in that, when the distance map results from the application, to the pixels of an image formed by a map taken from a database of elevation of the terrain, of a distance transform that uses a chamfer mask cataloging the distances of a pixel under analysis with respect to the nearest pixels, called pixels of the neighborhood, and that has axes of propagation (D0, D1, D2, D3, D4) oriented in the directions of the pixels of the neighborhood with respect to the pixel under analysis in the chamfer mask, the free angular sector has its opening oriented along the axis of propagation (D0, D1, D2, D3 or D4) nearest to the direction of motion of the craft.

14. The method as claimed in claim 12, characterized in that the free angular sector of propagation is bounded by bisectors of the angles formed by the axes of propagation (D0, D1, D2, D3, D4).